



Photo credit: G Smith/CIAT

Tools and services that create synergies and accelerate genetic gains of breeding programs targeting the developing world

The Excellence in Breeding Platform will modernize breeding programs targeting the developing world for greater impact on food and nutrition security, climate change adaptation and development. Drawing from innovations in the public and private sector, the Platform will provide access to cutting-edge tools, services and best practices, application-oriented training and practical advice.

Over the last few decades, the genetic improvement of crops and livestock has improved productivity and nutrition, reduced the pressure on forests, and made farms more resistant to shocks such as disease, pests and drought. It is estimated that 30-60% of yield increases in farmers' fields can be traced back to the work of geneticists.

Despite these advances, breeding programs targeting the developing world need to accelerate the rate of crop and livestock improvement in order to meet the 50-60 percent growth in demand for food expected over the 21st century with increasingly limited resources. Climate change alone will decrease crop productivity by 5 percent for every degree increase in global temperature.

There are many proven and emerging technologies from both the public and private sector that can help breeders meet this challenge. However, the pace of breeding program modernization in the developing world has been slow, with breeders lacking the resources and knowledge required to adopt new technologies. Meanwhile, too little information is shared between breeders working on different programs and commodities.

The CGIAR Excellence in Breeding Platform provides a space for information sharing, collaborative learning and access to tools and services for partners including CGIAR research centers, national research systems, advanced research centers and the private sector. By joining their efforts, breeding programs in the developing world can achieve the economies of scale that helped revolutionize the private sector, and greatly increase the rate at which crops are improved.

Impacts by 2022

The Excellence in Breeding Platform aims to become the one-stop place to go for advice, tested resources and best practices for any breeding targeting the developing world.

Depending on budget, the Platform will have from 10 to over 30 members by 2020, and a much wider base of users from the public and private sector.

Through the communities of practice set up by the platform, a common set of standards and best practices to measure breeding program performance and impacts for farmers. A web platform will be created to evaluate new tools, share knowledge and access

training between members and a broader community of breeders in the developing world. By working together, members will be able to access services such as genotyping at reduced cost, while programs with smaller budgets will capitalize on research taking place in public and private sector programs with greater resources.

- ▶ 20-30 percent increases to the breeding program output of members due to increased investment and return on investment
- ▶ An online breeding toolbox will be created for 5,000-10,000 users
- ▶ Software tools accessed by 1,000-2,000 users
- ▶ Phenotyping costs reduced by 25%



Photo credit: ACIAR

A Single Gene to Multiply Smallholder Flocks

In the 1990s, smallholder sheep farmers in Maharashtra, India faced a crisis. The coarse wool of their sheep no longer fetched a good price in the market. Scientists from the Australian Centre for International Agricultural Research (ACIAR) began a project to help them produce more meat instead.

Australian geneticists had traced a highly prolific breed popular in the developed world to sheep imported from West Bengal in the late eighteenth century. This was confirmed when the Booroola prolificacy gene, as it was known, was identified and mapped in 2001.

With a cheap DNA test now available, the ACIAR team was able to quickly pass only the prolificacy trait from the small West Bengali sheep into a large, meat-producing variety familiar to the farmers of Maharashtra. These sheep produced around 50 percent more lambs, showing that DNA technologies can practically benefit farmers in the developing world.

New Facilities Bring Advanced Maize Breeding to Sub-saharan Africa

In the developing world, farmers face greater challenges such as drought and rapidly-spreading new diseases. As a result, they can especially benefit from any new technologies to speed up the breeding process.

Doubled haploid maize breeding is a technique that has swept through the international private sector. It is estimated that 70-80 percent of the new maize hybrids produced by major companies were developed using the technology, which can halve the time taken to develop new varieties.

To put this technology to work for smallholder farmers in sub-Saharan Africa, CIMMYT partnered with the Kenya Agricultural and Livestock Research Organization (KALRO) to set up the first doubled haploid facility in sub-Saharan Africa, with financing from the Bill & Melinda Gates Foundation.

The facility makes doubled haploid breeding available to national agricultural research systems and small- to medium-sized seed companies, and is capable of producing at least 100,000 doubled haploid lines per year, as well as being a hub for training.



Photo credit: CIMMYT/P. Lowe

Where We Work

The Excellence in Breeding Platform will modernize breeding programs targeting the developing world.



Research

- **Breeding program excellence**
A standard breeding program performance management system to monitor successes and highlight investment needs.
- **Trait discovery and breeding tools and services**
A common platform to share tools, information and training modules.
- **Genotyping and sequencing**
Broker access to genotyping services at reduced cost, and support breeding programs to optimize the use of genotyping in their work.
- **Phenotyping**
Adapt cutting-edge phenotyping approaches for routine use in breeding programs, broker access to phenotyping expertise and improve infrastructure.
- **Bioinformatics and data management**
Harness the power of genotype, phenotype and other data by providing access to integrated bioinformatics tools and biometrics support.

Only 5 percent of private sector investment in breeding goes to programs targeting the developing world, even though this is home to 45 percent of the land used to grow major food staples, 48 percent of the global population and 84 percent of all poor.

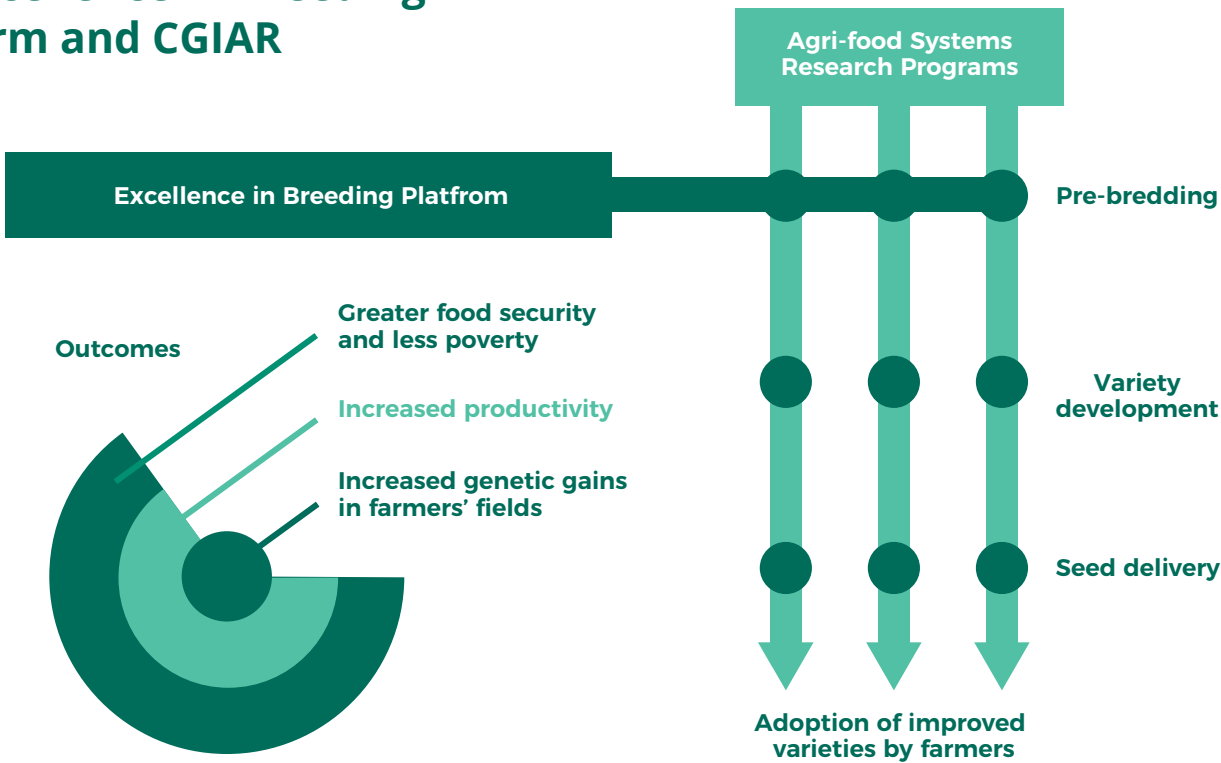
It is not often feasible for the private sector to breed improved varieties for target markets in the developing world. This leaves companies dependent on varieties bred by public sector research programs or CGIAR, or continue to sell varieties that are decades old. We estimate that 200-300 local private companies may be interested in starting or improving a cultivar development program.

National agricultural research systems (NARS) are limited by available agricultural research budgets and the importance of crops in each country. This means that, in the majority of

cases, it is not feasible to have a national breeding program dedicated to CGIAR mandate crops. Farmers of less important crops in these countries are reliant on the CGIAR or neighbours to deliver improved varieties.

With limited resources, the environments and farming systems of the developing world are too diverse to be covered adequately by the private sector or national research systems. As the most prominent source of germplasm and breeding knowledge in the developing world, CGIAR can help reach those farmers that are being left behind. NARS and the private sector will benefit directly from increased access to improved breeds and varieties, or by being enabled to adopt the tools, training and best practices developed and provided through the Platform.

The Excellence in Breeding Platform and CGIAR

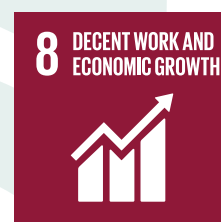


Global Partners for Impact



Working to Achieve the Global Goals

By increasing the effectiveness of breeding programs targeting the developing world, the Platform will thereby contribute to the achievement of eight Sustainable Development Goals outlined by the United Nations.



The CGIAR Excellence in Breeding Platform, led by the International Maize and Wheat Improvement Center (CIMMYT), provides access to cutting-edge tools, services and best practices, application-oriented training and practical advice to modernize breeding programs targeting the developing world for greater impact on food and nutrition security, climate change adaptation and development.

We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund
www.cgiar.org/funders

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